REMARKS/ARGUMENTS

Claims 1-15 and 17-26 remain in this application. Claims 10 and 23 have been amended. Claim 16 has been cancelled by a previous amendment. Claims 1-9 and 18-22 have been withdrawn as a result of an earlier restriction requirement. In view of the examiner's earlier restriction requirement, applicant retains the right to present claims 1-9 and 18-22 in a divisional application.

§ 112 Rejections

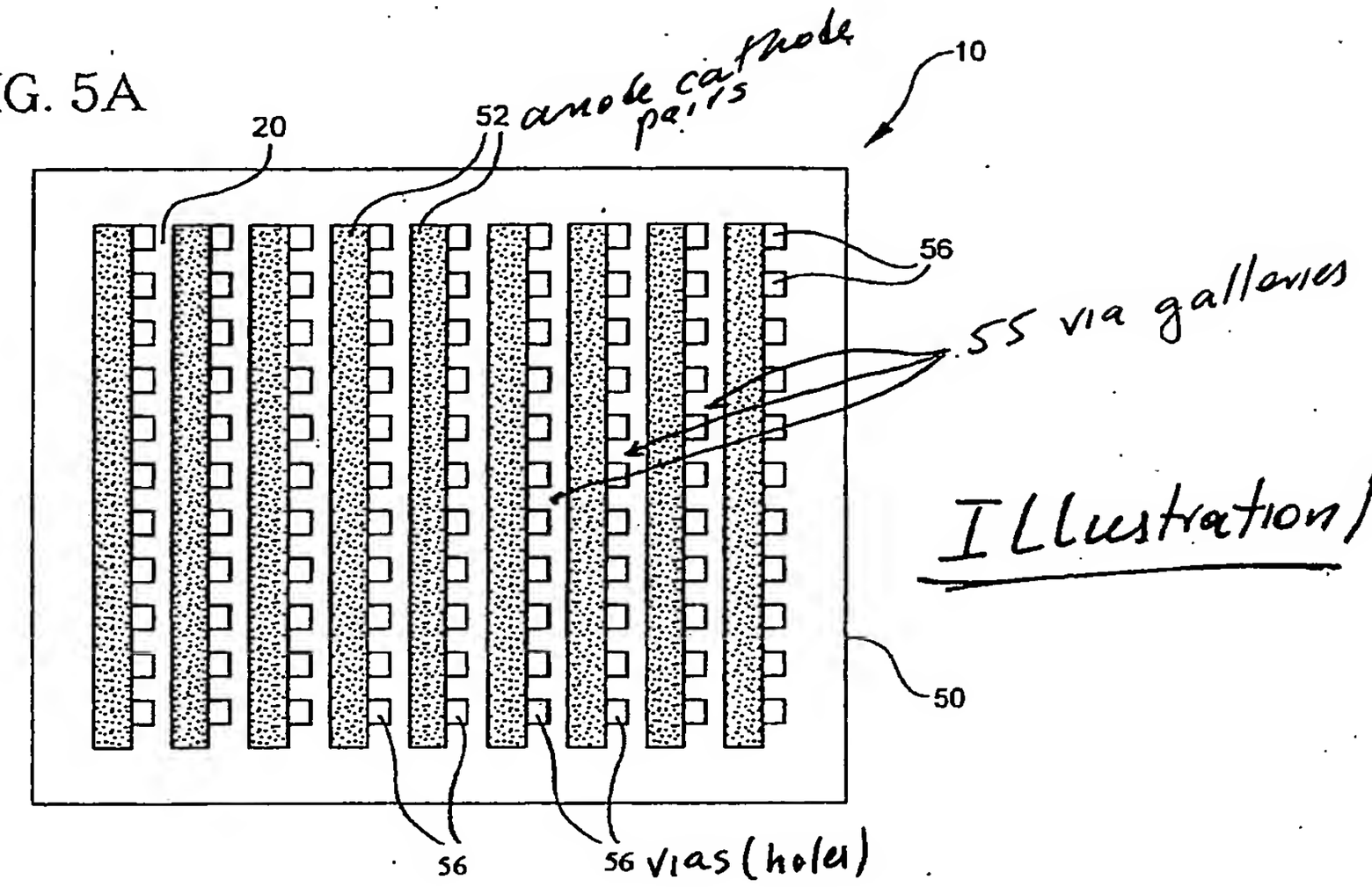
Claims 10-15 and 23-26 are rejected under 35 USC 112, first paragraph, because the specification, while being enabling for the intermediate electrolyte layer..., does not reasonably provide enablement to a solid oxide/electrolyte assembly comprising the electrolyte with the above feature"

The Examiner has rejected claims 10-15 and 23-26 under 35 U.S.C. § 112, first paragraph. In particular, the Examiner asserts that "the specification, while being enabling for an intermediate electrolyte layer 'wherein the average thickness of the electrolyte sheet situated under said at least one cathode and said at least anode is smaller than the average thickness of the electrolyte sheet not situated under said at least one cathode and said at least anode', does not reasonably provide enablement for a solid oxide electrode/electrolyte assembly comprising an electrolyte with the above feature....Applicant has not provided the existence of the working examples to illustrate a solid oxide fuel cell with the electrode features conforming to the claimed features."

Applicants respectfully disagree for the following reasons:

Claims 10-15 and 25-26 are supported and enabled by the Applicants' specification. For example, Paragraph [0077] of Applicant's specification describes that via galleries are spaces between electrodes (see **Illustration A**, below), which contain via holes.

FIG. 5A



That is, via galleries are not the holes, but the areas or regions of the electrolyte sheet that are situated between electrodes and contain and surround the via holes. Paragraph [0066] (see Example 2) also specifies that it is desirable to provide more thickness to the electrolyte sheet in these regions-i.e., the via gallery regions. This paragraph is reproduced below (underlines added) for Examiner's convenience.

> "Applicants also discovered that it is desirable to modulate the electrolyte thickness in a patterned fashion in order to improve its net mechanical properties. First consider the case of an electrolyte of uniform thickness. If the space between electrode strips (i.e., via galleries **55**) has less printed material (to accommodate vias and/or via pads) the via gallery will be comparatively less "stiff" then the electrode regions. On flexure of the device, the via gallery regions will be subject to stress concentration because they are relatively more flexible than the electrode regions and will have a relatively short radius of curvature. In this case, because we wish to avoid concentrating stress in the regions between the electrodes which contain the vias (i.e., through holes), a more uniform flexure is desired throughout the electrolyte sheet. Therefore, it

will be advantageous to provide more thickness in the via gallery regions, which will provide more uniform flexure of the electrolyte sheet. "

Figures 11A and 11B, for example, illustrate an electrolyte sheet with such features. More specifically, paragraph [0067] describes that the regions with thickness t_1 of the electrolyte sheet will become via galleries and that the thinner regions with the thickness t_2 will be printed with the electrode layers. Also, for example, paragraph [0073] (Example 4) describes how to make an exemplary electrolyte sheets that have a different thickness area, and describes two more additional configurations of the electrolyte sheets. Also, for example, Figures 14A and 14B, illustrate the indented or thinner areas 30. Figure 14C corresponds to Figs 14A and 14B and shows thinner areas t_1 of the electrolyte sheet (that correspond to via galleries) and thicker areas (areas with thickness t_2 that will be printed with the electrode layers).

Independent Claim 23 has been amended to specify that the claim device has a plurality of cathodes and anodes. Claim 24 depends from claim 23 and thus also include this feature. Claim 10, and its dependent claims also include this feature. Figure 5A (see illustration A, above) illustrates a solid oxide electrode/electrolyte assembly comprising electrodes 52, as well as the via galleries situated therebetween, and the via holes (56) located inside the via galleries (55).

Claims 10-15 and 23-26 are rejected under 35 USC 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The Examiner stated: "Regarding claims 10 and 23, the limitation "not situated under said at least one cathode and at least anode" is indefinite because the subject matter is not clearly pointed out. Figures 11A and 11B show printing one electrode not both electrodes. Paragraph [0067] describes the thicker portion t_2 being the "via gallery" which is disclosed earlier in the instant disclosure as a hole and so no electrolyte is present to be thicker than any other portion".

Applicants respectfully disagree with this assertion. Via gallery (55) is not a via hole (56) and has not been described as such. A via hole is a hole contained within the via gallery. A via gallery is an area or region between electrodes- i.e. the electrolyte sheet strip situated between electrode strips, which is provided to accommodate the via holes (vias) and via pads.

For example, paragraph [0039] of Applicant's specification teaches that "assembly **50** includes a plurality of anode-cathode pairs **52, 54**. The anode-cathode pairs **52, 54** are separated from one another by via galleries **55**. The via galleries **55** include a plurality of interconnects (called "via interconnects") **56'** situated in the vias **56**. These interconnects **56'** conduct electronic current from the anode of one cell to the cathode of an adjacent cell. It is preferable that the body of the electrolyte sheet **10** which is located under the electrodes (anode(s) and cathode(s)) is relatively thin. That is, it is preferable that of 50% and more preferably 75% of the area under the electrodes be thinned. This design is notable for the absence of expensive interconnect plates."

Also, for example, as clearly described in paragraph [0066] of the Application, this area (via gallery) of the electrolyte sheet does not have the electrodes imprinted thereon, and thus, unless thickened (relative to the electrolyte sheet area under the electrodes), will be a subject to stress concentration during flexure of the electrolyte sheet. Thus, according to the Applicant's teachings, it is "advantageous to provide more thickness in the via gallery regions".

Furthermore, with regard to Examiner's assertion that "Figures 11A and 11B show printing one electrode not both electrodes", it is well known to one of skill in the art that the fuel cells include two electrodes with the electrolyte being sandwiched therebetween. Such an assembly is shown, for example, in Figures 5A and 10 of the instant specification.

Thus, Claims 10-15 and 23-26 are not indefinite under 35 USC 112, second paragraph.

§ 103 Rejections

Claims 10-12, 15 and 23-26 rejected under 35 USC 103(a) as obvious over US Patent Publication 2003/0180602 (Finn) in view of US 2002/0012825 (Sasahara).

The Examiner stated that Figures 2 and 8 of the Sasahara reference illustrate textured electrolyte sheet that have thicker areas around perimeter (thicker sealing portions). The Examiner stated that these "thicker sealing portions allow the separater plate to be thinner, thereby decreasing the overall thickness of the fuel cell."

Applicants' claim 10 and now specifies that the thicker portions of the electrolyte correspond to the via galleries. This feature is not disclosed by either of the two cited references. Claims 11-12, 15 and 25-26 depend from claim 10 as their base claim. Therefore, because the two cited references, in combination, do not disclose all of the claim elements of claims 10-12, 15 and 25-26, these claims are not obvious over US Patent Publication 2003/0180602 (Finn) in view of US 2002/0012825 (Sasahara).

Claim 23 has been amended to specify that the solid oxide electrode/electrolyte assembly has a plurality of cathodes and a plurality of anodes situated on the electrolyte sheet and that the assembly does not include interconnect (separator) plates (see, for example, paragraph [0039] of the Applicant's specification for support). These features are not described in the two cited references (Finn or Sasahara). Claims 24 depends from claim 23 as its base claim, and thus incorporates all of the features of claim 23. Therefore, because the two cited references, in combination, do not disclose all of the claim elements of claims 23-24, these claims are not obvious over US Patent Publication 2003/0180602 (Finn) in view of US 2002/0012825 (Sasahara).

Claims 10-15 and 23-26 are rejected under 35 USC 103(a) as being unpatentable over US Patent Publication 2001/0044043 (Badding) in view of US Patent Publication 2003/0180602 (Finn) and US 2002/0012825 (Sasahara).

As described above, Applicants' claim 10-15 and 25-26 now specify that the thicker portions of the electrolyte correspond to the via galleries. This feature is not disclosed by either of the two cited references. Therefore, because the two cited references, in combination, do not disclose all of the claim elements of claims **10-15 and 23-26**, these claims are not obvious over US Patent Publication 2001/0044043 (Badding) in view of US Patent Publication 2003/0180602 (Finn) and US 2002/0012825 (Sasahara).

Both the Finn and the Badding references are silent with regard to the average thickness of the electrolyte sheet under the electrode being smaller than the portion not under the electrodes. Fig. 3B of the Sasahara reference illustrates utilises a thinner portion under of the electrolyte sheet being located under electrode, to provide flow channels for reactant(s), which results in thinner the separator plates (interconnect plates). This is shown, for example, Figs 1 and 2 of the Sasahara reference. Applicant' claim 23 specifies that the claimed assembly has no inter connect plates (i.e., no separator plates). The Badding reference also does not disclose such plates. Accordingly, there is no motivation to modify the Badding reference with the features of Finn Sasahara, as suggested by the Examiner. Therefore, claims **23-24** are not obvious over US Patent Publication 2001/0044043 (Badding) in view of US Patent Publication 2003/0180602 (Finn) and US 2002/0012825 (Sasahara).

Claims 13 and 14 are rejected under 35 USC 103(a) as being unpatentable over US Patent Publication 2003/0180602 (Finn) in view of US 2002/0012825 (Sasahara).

Claims 13 and 14 depend from claim 10 as their base claim, and thus expressly include the language of the amended claim 10. Accordingly, claims 13 and 14 are not unpatentable over US Patent Publication 2003/0180602 (Finn) in view of US 2002/0012825 (Sasahara), because theses references, in combination, do not do not disclose all of the claim elements of claims 13 and 14.

Furthermore, neither the Finn nor the Sasahara reference disclose "average electrolyte sheet thickness is between 4 and 15 micrometers" (see claim 13), nor "the average electrolyte sheet thickness is between 8 and 15 micrometers" (see claim 14). The Examiner pointed out that Finn discloses an average thickness of 20 microns and stated that "Claims that differ from the prior art only by slightly different (non-overlapping) ranges are prima facie obvious without showing that the claimed range achieves unexpected results relative to prior art". Applicants respectfully disagree that the ranges claimed in claims 13 ad 14 are **only slightly** different from the range disclosed by the Finn reference.

Applicants Claims 13 and 14 call for a maximum thickness of 15 μm, which is a lot (25%) smaller than the minimum thickness described in paragraph [0195] of the Finn reference, and more than 3 times smaller than the preferred minimum thickness of 50 μm. This is not an "only slightly different" range.

It is not obvious that making the electrolytes sheets within the claimed thickness range and with the specific claimed thickness variations will not jeopardize electrolyte's integrity and strength. It is Applicants who realized that by making the electrolytes sheets within the claimed thickness range and with the specific claimed thickness variations, the electrolyte sheet will maintain its structural integrity, while the ohmic resistance will be improved beyond 0.5 ohms/cm^2. As mentioned in the previous respons, flexibility and strength of the electrolyte sheet is not an inherent characteristic of the electrolyte sheet, because these properties of the electrolyte sheet depend on: (i) overall or regional flatness of the electrolyte sheet, (ii) electrolyte sheet microstructure, and (iii) size and frequency of inclusions or defects. **Furthermore, as described above, the Finn reference discloses an electrolyte sheet made of a different material than the one claimed by the Applicants.**

Claims 10-15 and 23-26 rejected under 35 USC 103(a) as obvious over US Patent Publication 2003/0180602 (Finn) in view of US 2002/0012825 (Sasahara) and US 2001/0044041 (Badding).

As described above, Applicants' claim 10-15 and 25-26 now specify that the thicker portions of the electrolyte correspond to the via galleries. This feature is not disclosed by either of the three cited references. Therefore, because cited references, in combination, do not disclose all of the claim elements of claims 10-15 and 25-26, these claims are not obvious over US Patent Publication 2003/0180602 (Finn) in view of US 2002/0012825 (Sasahara) and US 2001/0044041 (Badding).

With regard to claims 23 and 24, these claims specify that the claimed device has no interconnect (separator) plates. The Finn reference discloses such plates. Thus, modifying the Finn reference by replacing the Finn electrolyte sheet with the partially stabilised sheet of Badding would still yield a different design than the one claimed by the Applicants. Furthermore, since Applicants' design lacks these plates, there is no need to thin them. Accordingly, there is no motivation to combine these references.

Therefore, Claims 10-15 and 23-26 are not obvious over US Patent Publication 2003/0180602 (Finn) in view of US 2002/0012825 (Sasahara) and US 2001/0044041 (Badding).

Conclusions

Based upon the above amendments, remarks, and papers of records, applicant believes the pending claims of the above-captioned application are in allowable form and patentable over the prior art of record. Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Applicant believes that no extension of time is necessary to make this Reply timely. Should applicant be in error, applicant respectfully requests that the Office grant such time extension pursuant to 37 C.F.R. § 1.136(a) as necessary to make this Reply timely,

and hereby authorizes the Office to charge any necessary fee or surcharge with respect to said time extension to the deposit account of the undersigned firm of attorneys, Deposit Account 03-3325.

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Respectfully Submitted,

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